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ABSTRACT

The Early Childhood Inventories Project (ECIP) was initiated to originate aptitude/achievement type inventories which could assess very specific behaviors of young children, particularly disadvantaged children. In practice these inventories are "non-specific" type criterion-referenced measures. This first aspect of the project involved the comparison of three educational programs, the IDS "enrichment" program, a Head Start program, and regular New York City Board of Education programs. Sample populations were randomly drawn from preschool, kindergarten, and first grade classes. Six instruments developed for this purpose by the ECIP staff were employed in the gathering of data. Preliminary analysis of the pretest data appeared to indicate that such enrichment programs produce significant positive effects in the educational development of young inner-city, low socio-economic status Negro children from New York City. The data showed a general trend for children in the IDS enrichment program to obtain higher scores on these measures than the Head Start group who in turn, obtained higher scores than children in the regular New York City Board of Education program. Appendices include: A list of thirteen sub-tests and the possible range of scores; score sheet; tables of means, standard deviations, and standard errors of the means squared; and a summary table of critical ratio levels of significance for group differences. (PR)

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Preliminary Report on the Use of Several Early Childhood Inventories for The Evaluation of Educational Programs

Report #3A

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Institute for Developmental Studies
School of Education
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March, 1968

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Jack Victor
Alan Coller

Introduction

Many available standardized tests of ability, developed for the young child, are designed to provide a general picture of the child's performance across a wide but incomplete spectrum of behavior. The global measures yielded by such tests do not indicate how well the child fared on each of the included abilities. Often separate scores cannot be determined readily; frequently, even when sub-test scores can be calculated, as in multiple-aptitude batteries, one finds that the item pool is simply not practical, and cannot fulfill many of the current assessment needs. Of late, psychologists and educators have come to realize that such tests have limited use as diagnostic instruments. It is felt that emphasis should now be placed on constructing instruments which would provide a more complete picture of the child's ability within a narrow band of behavior. A battery of these specially constructed tests can give a profile of the child's strengths and weaknesses across a number of very specific ability areas, thereby providing information of obvious diagnostic value.

The Early Childhood Inventories Project (ECIP), currently under the joint directorship of Alan Coller and Jack Victor, was initiated at the Institute for Developmental Studies (IDS) for the purpose of developing original aptitude/achievement-type inventories which could be used to assess very specific behaviors of young children, particularly disadvantaged children. The

inventories, which measure behaviors appropriate to early childhood educational goals, are designed to be used for a variety of purposes: 1) the evaluation and comparison of educational programs, such as, the IDS "enrichment" program, Head Start programs, etc., 2) the evaluation and comparison of experimental curricula, 3) the establishment of curricula based upon an assessment of group abilities and disabilities, and 4) the determination of individual differences which could have immediate diagnostic and predictive value for the teacher.

The study to be described below has three primary purposes: 1) the comparison of several educational programs, 2) the collection of normative data, and 3) the preliminary standardization of six inventories developed by the ECIP staff. This report will only deal with the first primary purpose; i.e., the comparison of several educational programs, namely, the IDS "enrichment" program, a Head Start program, and regular New York City Board of Education programs. Other comparisons are cross-sectional in nature and cover pre-kindergarten, kindergarten and first-grade classes.

Inventories

The following six inventories developed by the ECIP staff at the Institute for Developmental Studies are being used in the study to be described:

1. Same/Different Inventory-3 (S/DI-3)
2. Body Parts Name Inventory (BPNI)
3. Color Name Inventory (CNI)

4. Shape Name Inventory (SNI)

5. Numeral Name Inventory-1 (NNI-1)

6. Alphabet Name Inventory/Printed Upper Case (ANI/PUC)

For purposes of analysis, these six inventories have been broken down into thirteen subtests (or measures). All of the inventories, with the exception of the Same/Different Inventory-3, have a "nonverbal"[1] and a "verbal"[2] subtest. In addition, the Body Parts Name Inventory has a "functions" subtest. The Same/Different Inventory-3 contains two nonverbal subtests, "same" and "different."

The six inventories listed above are more fully described elsewhere. It should be noted that all of the inventories except the S/DI-3 and the BPNI have alternate forms.

Subjects

The children in this study are low socioeconomic status pre-kindergarten, kindergarten, and first-grade inner-city Negro boys and girls attending public schools in the Harlem area of New York City. In this study, there are eight groups--two prekindergarten groups, three kindergarten groups and three first-grade groups. The groups are described below. The first set of capital letters indicate whether the group is either in Enrichment group (E) or a Comparison group (C or CHS). The lower case letters or numbers

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[1] nonverbal subtests are tests of receptive language or recognition memory.

[2] verbal subtests are tests of expressive language or recall memory.

which follow indicate the grade in which the group officially started school. The capital letters or numbers which follow the hyphen indicate the grade in which the groups are presently enrolled.

GROUP DESIGNATIONS

Epk-PK -- An Enrichment group now entering IDS prekindergarten.

Epk-K -- An Enrichment group having enriched prekindergarten experience now entering IDS kindergarten.

Epk-1 -- An Enrichment group having had enriched pre-kindergarten and kindergarten experience now entering IDS first grade.

CHSpk-PK -- A group now entering the N.Y.C. Board of Education Head Start Prekindergarten.

CHSpk-K -- A group having had Head Start pre-kindergarten experience now entering the N.Y.C. Board of Education Head Start kindergarten.

Ck-K -- A group having had no pre-kindergarten experience now entering the regular N.Y.C. Board of Education kindergarten.

Ck-1 -- A group having had no pre-kindergarten experiences, but having had regular kindergarten experience, now entering the regular N.Y.C. Board of Education first grade.

C1-1 -- A group having had no kindergarten experience (although some have had prekindergarten experience) now entering the regular N.Y.C. Board of Education first-grade.

Comparison Groups

	Enrichment	Head Start	Kindergarten	First Grade
Pre-kindergarten	Epk-PK	CHSpk-PK		
Kindergarten	Epk-K	CHSpk-K	Ck-K	
First Grade	Epk-1		Ck-K	C1-1

There are three IDS enrichment groups (one from each grade level Epk-PK, Epk-K and Epk-1), two Head Start[1] control groups (pre-kindergarten CHSpk-PK, and kindergarten CHSpk-K); two groups of children who began school in kindergarten (one group now entering kindergarten, Ck-K), and one now in first grade, Ck-1); and finally, one group of children who are now entering first grade without having had any kindergarten experience, Cl-1. (Note: Almost one-half of this last group did have some form of pre-kindergarten experience).

Design of Study

There are two parts to this study: 1) a pre-test, which began in the last week of October, 1967, some three weeks after school commenced (New York City schools began late due to a teacher strike) and 2) a post-test--to begin sometime in the Spring of 1968.

This report will address itself only to a preliminary analysis of pre-test data. Pretesting was completed after about five weeks of testing.

The six inventories listed above were administered to 220 children over two sessions. During the first session, the Body Parts Name Inventory (BPNI) and the Color Name Inventory (CNI) were administered in full, while only one of the two alternate forms of the "non-verbal" sub-tests of the Numeral Name Inventory-1 (NNI-1) and Alphabet Name Inventory/Printed

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[1] It should be noted that Head Start programs differ from one another. Therefore, it is not necessarily the case that the Head Start program evaluated in this study is representative of Head Start programs in general.

Upper Case (ANI/PUC) were administered. During the second session, the Same/Different Inventory-3 (S/DI-3) and the Shape Name Inventory (SNI) were administered in full, while the remaining alternate forms of the non-verbal sub-tests of the Numeral Name Inventory-1 (NNI-1) and Alphabet Name Inventory/ Printed Upper Case (ANI/PUC) were administered. Depending upon the child, each session lasted between twenty and forty-five minutes.

Data Analysis

We must stress the fact that the following analyses are preliminary and basic. Future analyses might very well require us to revise the results and interpretations found herein. Pressures for the dissemination of these results, even in their unrefined form, led us to believe that these results should be reported as early as possible.

Most of the results presented below are based upon a Critical Ratio (CR) analysis of differences between independent means, a few analyses made use of the "t" test. No other statistical tests of significance were used for this report. Future reports will include a multivariate analysis thereby providing a more sensitive test of the results of this study.

It should be noted that most non-verbal (receptive language) scores are notated NV-2 in the tables. This refers to the fact that the scores represent the total "2" scores per inventory. A "2" score is a score representing a correct response on any particular item on both forms. Hence, each item must be

recognized twice to be scored as correct. This procedure acts as a check on guessing and, therefore, gives us a rather stringent measure of the child's ability. The results of studies using similar tests as our non-verbal measures may, therefore, yield higher scores than our measures do. Obviously, the total correct on either alternate form taken by itself is at least as high and usually higher than the total score reported here as NV2.

RESULTS

A. Group Differences within Grade Levels

1. Prekindergarten

None of the thirteen Critical Ratios (CRs) reached the .05 level of significance.** These findings support the hypothesis that the IDS enrichment prekindergarten group (Epk-PK) and the Comparison Head Start prekindergarten group (CHSpk-PK) do not differ prior to exposure to the school situation. Further support for the above hypothesis is obtained from analyzing the results of the Peabody Picture Vocabulary Test (PPVT) and the Stanford-Binet/Form L-M (S-B) which were administered to the above mentioned children at about the same time as the Early Childhood Inventories. Statistical tests of the differences between the two groups using the t-test statistic did not reach the .05 level of significance,** thereby adding support to the thesis that the groups do not differ from each other. The mean scores on the PPVT for the Epk-PK and CHSpk-PK, respectively, were 68.03 and 63.87. For the Stanford-Binet the mean scores were 91.97 for the Epk-PK group and 86.17 for the CHSpk-PK group.

2. Kindergarten

a. An examination of the results obtained from the IDS enrichment kindergarten group (Epk-K) and the Comparison Head Start kindergarten group (CHSpk-K) revealed that seven

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*one tailed test
**two tailed test

of the thirteen measures reached significance at least at the .05 level.* All of the significant differences were in the direction of the IDS group. The one-tailed test was used because of an experimental hypothesis which predicted the direction of the differences at the kindergarten level E>CHS>Ck.

Three mean differences were in the direction contrary to the experimental hypothesis. Though not significant, these differences were in favor of the Comparison Head Start group. The differences occurred on the two sub-tests of the Same/Different Inventory-3 (S/DI-3) and on the Functions sub-test of the Body Parts Name Inventory (BPNI-F).

Inspection of the seven significant CRs revealed that the advantage of the Epk-K group lay heavily in increased skill in expressive language.[1] Significant CRs* were obtained on all five verbal sub-tests. The non-verbal sub-tests of the Color Name Inventory (CNI-NV) and the Alphabet Name Inventory/Printed Upper Case (ANI/PUC-NV) also yielded significant CRs in favor of the Epk-K group.

These differences are all the more telling when considering results obtained from administering the PPVT and S-B to these subjects prior to educational intervention. As in the case of the current prekindergarten children, we found no significant difference** on either the PPVT or the S-B between the IDS enrichment children and the Comparison Head Start

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[1]Expressive language here relates to the ability to recall the appropriate label of a stimulus.

children. The mean scores on the PPVT for the Epk-k and CHSpk-K, prior to educational intervention, were 71.63 and 68.39 respectively. For the S-B the mean scores were 95.70 for the Epk-K group and 94.32 for the CHSpk-K group.

b. Comparison of all 13 measures between the IDS enrichment kindergarteners (Epk-K) and comparison children beginning the regular New York City Board of Education kindergarten (Ck-K) yielded differences in the hypothesized direction. All mean differences were in the direction of the IDS group. Only two mean differences did not reach significance at the .05 level.* The measures not reaching significance were the Same sub-test of the Same/Different Inventory-3 (S/DI-3-S) and the Functions sub-test of the Body Parts Name Inventory (BPNI-F).

c. Comparison Head Start kindergarten children (CHS-pk-K) obtained higher mean scores on 12 of the 13 measures than did the comparison children who were beginning the regular New York City Board of Education kindergarten (Ck-K). However, only four of these mean differences reached significance at the .05 level.* The CHSpk-K group did significantly better on both sub-tests of the Same/Different Inventory-3 (S/DI-3) and on the Verbal and Functions sub-tests of the Body Parts Name Inventory (BPNI-V and BPNI-F).

3. <u>First Grade</u>

a. Children in the IDS enrichment first-grade group (Epk-1) obtained higher mean scores on all 13 measures than: 1) comparison children whose first experience in school was in

a regular New York City Board of Education kindergarten and at the time of testing were entering a regular first-grade class (Ck-1), and 2) comparison children who did not have regular kindergarten and at the time of testing were entering a regular New York City Board of Education first-grade class (C1-1).

Seven of the differences between the IDS enrichment first graders (Epk-1) and the Ck-1 are significant, at least at the .05 level.* The one-tailed test was also used for the first grade comparisons because an experimental hypothesis predicted the direction of the differences, E>Ck>C1. The seven measures which yielded significant differences in favor of the IDS group were: both sub-tests of the Numeral Name Inventory-1 (NNI-1); the three sub-tests of the Body Parts Name Inventory (BPNI); the verbal sub-test of the Alphabet Name Inventory/Printed Upper Case (ANI/PUC-V); and the non-verbal sub-test of the Color Name Inventory (CNI-NV).

With only the exception of the Different sub-test of the Same/Different Inventory-3 (S/DI-3-D), all of the mean differences between the Epk-1 group and the C1-1 group are significant at least at the .05 level.*

b. The first-grade children who had attended regular kindergarten, (Ck-1) had higher mean scores on all measures than the group of first-grade children who had not attended kindergarten (C1-1). Six of these differences reached significance at least at the .05 level.* The six measures which yielded

significant differences were the non-verbal and verbal sub-tests of the Color Name Inventory (CNI), the Shape Name Inventory (SNI) and the Body Parts Name Inventory (BPNI-NV and BPNI-V).

B. Cross-Sectional Differences Within Groups

Generally, the inventories were able to distinguish significantly between children in different grade levels within the same comparison group. Hence, the first-grade IDS enrichment group (Epk-1) obtained higher mean scores on all measures than did the IDS enrichment kindergarten group (Epk-K) who, in turn, obtained higher mean scores on all measures than the IDS enrichment prekindergarten group (Epk-PK).

Likewise, the Comparison Head Start kindergarten group (CHSpk-K) obtained higher mean scores on all measures than the Comparison Head Start prekindergarten group (CHSpk-PK). The first-grade group who began school in kindergarten (Ck-1) obtained higher mean scores on all measures than the group that was first entering regular kindergarten (Ck-K).

All but five of the 52 possible within-group comparisons reached significance at least at the .05 level.* A one-tailed test was used in these cases because of an experimental hypothesis which predicted a within-group grade effect, 1>K>PK. The difference between the Ck-K and Ck-1 groups on the non-verbal sub-test of the Body Parts Name Inventory (BPNI-NV) did not reach significance. The remaining four non-significant differences involved comparisons between the IDS enrichment kindergarteners (Epk-K) and the IDS enrichment first graders (Epk-1).

The measures which did not reach significance were the non-verbal and verbal sub-tests of the Alphabet Name Inventory/Printed Upper Case (ANI/PUC), and the verbal sub-tests of the Color Name Inventory (CNI-V) and the Shape Name Inventory (SNI-V).

C. Cross-Sectional Differences Across Groups

1. Kindergarten and prekindergarten comparisons.

Such analyses were not made, since intervention had not yet occurred for the prekindergarten groups.

2. First grade and kindergarten comparisons.

a. The mean scores of the IDS enrichment kindergarten group (Epk-K) were found not to be significantly different** from the mean scores of the comparison group of children a grade higher who had had regular New York City Board of Education kindergarten experience (Ck-1). Only on the Same sub-test of the Same/Different Inventory-3 (S/DI-3-S) was a significant difference obtained in favor of the first-grade group.

b. In contrast, the Comparison Head Start kindergarten group (CHSpk-K) obtained significantly lower mean scores** than the aforementioned first grade group (Ck-1) on both sub-tests of the Shape Name Inventory (SNI) and Numeral Name Inventory-1 (NNI-1), as well as on the non-verbal sub-test of the Alphabet Name Inventory/Printed Upper Case (ANI/PUC-NV). The mean scores of the Comparison Head Start group (CHSpk-K) and the first-grade, Ck-1 group did not differ significantly on the remaining eight measures.

c. Significant differences** were obtained on six

measures when the IDS enrichment kindergarten group (Epk-K) was compared to the comparison group of first graders who did not have any kindergarten experience (C1-1). All of these significant differences were in favor of the IDS children who were one grade lower. The IDS enrichment kindergarten group (Epk-K) obtained significantly higher mean scores on the verbal and non-verbal sub-tests of the Color Name Inventory (CNI), the Shape Name Inventory (SNI), and the Body Parts Name Inventory (BPNI-V and BPNI-NV).

d. The Comparison Head Start kindergarten group (CHSpk-K) obtained significantly higher mean scores** than the aforementioned first-grade group (C1-1), on the verbal and and non-verbal sub-tests of the Body Parts Name Inventory (BPNI-V and BPNI-NV). However, the CHSpk-K group obtained significantly lower scores** on both sub-tests of the Numeral Name Inventory-1 (NNI-1). No other differences between these groups were found to be significant.

e. When the kindergarten group with no pre-kindergarten experience (Ck-K) is compared with a group of first-grade children who had had no kindergarten experience (C1-1), the grade effect is apparent. The C1-1 group obtained significantly higher mean scores** on six of the 13 measures - both sub-tests of the Same/Different Inventory-3 (S/DI-3), the Numeral Name Inventory-1 (NNI-1), and the Alphabet Name Inventory/Printed Upper Case (ANI/PUC).

DISCUSSION

A preliminary analysis of the results of this study appear to indicate that the Institute for Developmental Studies (IDS) enrichment program and the New York City Board of Education Head Start program compared in this study produce significant positive effects in the educational development of young, inner-city, low socio-economic status Negro children from the Harlem area of New York City.

Children entering kindergarten after having attended either the IDS prekindergarten enrichment program or the New York City Head Start prekindergarten program obtained higher mean scores on the six Early Childhood Inventories used in this study than did children entering kindergarten without having had the benefit of prekindergarten experience.

It is possible to argue that the IDS prekindergarten program or the Head Start prekindergarten program did not actually produce educational change. It might be said that the children who did not have the benefit of prekindergarten experience (CKs) were different initially from the children who entered the IDS or Head Start prekindergarten programs. After all, the parents who placed their children in prekindergarten had to be "interested enough" in their children to volunteer them for enrichment. If these groups differed initially in some major way, then any conclusions concerning the beneficial effects of prekindergarten experience must be considered tenuous in nature.

There is, however, indirect evidence which tends to support

the assumption of initial equivalence of these groups. The initial design of the IDS enrichment evaluation study included a comparison group of children (comparison self-selected-CSS) whose parents volunteered them for the IDS prekindergarten program, but who were randomly excluded from having enrichment. When tested with the Peabody Picture Vocabulary Test (PPVT) and the Stanford-Binet (S-B), this group, generally, was no different from the group of children who were randomly selected to attend the IDS enriched prekindergarten. When the comparison self-selected group entering kindergarten (CSS-K) was compared with the non-self-selected group entering kindergarten (Ck-K) on the Peabody Picture Vocabulary Test and on the Stanford-Binet no significant differences were obtained.[1] One can assume, therefore, that if the enriched group (E) and the comparison self-selected group (CSS) did not differ initially and if the comparison self-selected (CSS) group and the non-self-selected (Ck) group did not differ at kindergarten, then all things being equal, the enriched (E) group and the non-self-selected (Ck) group did not differ initially. Given this assumption, the data seems to support the contention that pre-kindergarten experience produces educational change.

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[1] The comparisons mentioned here involve the combined scores of three successive CSS and Ck-K groups which were used as comparison groups for the 1963-4, 1964-5 and 1965-6, IDS enrichment pre-kindergarten groups, respectively. The mean S-B scores were 92.15 for the CSS groups and 90.48 for the Ck-K groups. The mean PPVT scores were 72.65 for the CSS groups and 72.13 for the Ck-K groups. It should be noted that the CSS children were tested slightly earlier than the Ck-K group. The CSS children were tested at the end of what would have been their pre-kindergarten year, while the Ck-K groups were tested at the beginning of kindergarten.

We do not mean to imply from the above that mere attendance in a pre-kindergarten program is sufficient to produce positive educational change. The type of pre-kindergarten program is a crucial factor. While both the IDS and Head Start pre-kindergarten programs appeared to affect educational performance, the educational value of these programs was not equivalent. For example, while the Head Start kindergarten children (CHSpk-K) obtained higher scores than the CK group on virtually every measure, only four of the thirteen possible differences reached a satisfactory level of statistical significance. In contrast, IDS kindergarteners (Epk-k) obtained significantly higher scores than the CK group on eleven of the thirteen measures.

When the IDS kindergarteners (Epk-k) are compared directly with the Head Start kindergarteners (CHSpk-k) we find that the IDS group obtains significantly higher scores on seven of the thirteen measures. In no case does the Head Start kindergarten group score significantly higher than the IDS kindergarten group. Given that the two groups were equivalent prior to any intervention, the results would indicate that more positive effects result from the IDS prekindergarten program than from the New York City Head Start pre-kindergarten program.

There are also good reasons to assume that these two groups were initially equal. When tested with the Peabody Picture Vocabulary Test and the Stanford-Binet prior to receiving educational intervention at prekindergarten, both groups obtained equivalent scores. Moreover, no differences were obtained between a group

of children beginning IDS prekindergarten and a group of children beginning the Head Start prekindergarten.

The positive effect of the IDS Enrichment program extends also into first grade. When we compare the IDS Enrichment first-grade children to a group of first-grade regular kindergarten graduates and to a group of children entering regular first grade without having had the benefit of kindergarten experience, we find that the IDS Enrichment children obtain significantly higher scores on a majority of the thirteen measures.

Indeed, when we compare the IDS Enrichment kindergarten children to first-grade children having had regular kindergarten experience, we find that the older children obtain a significantly higher score on only one of the thirteen measures. Assuming initial equivalence, it is possible to conclude that the IDS Enrichment program has advanced the children about a year in their educational development, at least on the measures used in this study.

In comparison, the Head Start children obtain equivalent scores on eight of the thirteen scores. The older children obtain significantly higher scores on the remaining five measures.

A further illustration of the relative efficacy of IDS Enrichment and Head Start is found in the comparison of the three kindergarten groups to the group of first-grade children who did not have the benefit of kindergarten. The grade effect is shown in the comparison of this last group to children

beginning regular kindergarten (all six significant differences are in the direction of the older children). However, Head Start kindergarten children obtain either equivalent or higher scores than the older children on all but two measures. In contrast to both these kindergarten groups, the IDS Enrichment kindergarten children obtain higher scores than the older children on six of the thirteen measures. None of the remaining seven measures shows any difference between the two groups.

Some final comments on the possible implications of these results should be made. The findings of this study do not necessarily reflect differences in the <u>effectiveness</u> of the different educational programs compared. Any conclusions drawn from these results must take into account the fact that educational goals may vary from one program to another. Some programs may not even have a curriculum for some of the achievement areas measured by the battery of Early Childhood Inventories used in this study. Other behaviors may have been emphasized at the expense of those skills measured by this battery of inventories in the comparison groups.[1] On the other hand, IDS children might well have fared better than the comparison groups, no matter what relevant skill areas had been selected for investigation. Observations concerning the training of cognitive skills

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[1]For example, certain reading programs suggest that teachers should avoid teaching the child to label the letters of the alphabet, the implication being that this practice would interfere with initial reading skills. The IDS approach, on the contrary, includes teaching alphabet names to mastery on the assumption that this will actually facilitate initial reading skills.

in the programs evaluated here certainly suggest the liklihood of this latter interpretation.

Although the results discussed here are preliminary, they are so striking that there is no doubt that the Early Childhood Inventories will play an important role in future evaluations of early childhood educational programs.

ECIP

Appendices

A. Sub-Tests and Possible Range of Scores

B. Score Sheet with Facsimile of Inventory Items

C. Tables of Means, Standard Deviations, and Standard Errors of the Mean Squared for each Inventory

D. Combined Table of Means and Standard Deviations (over the eight groups + 13 measures)

E. Summary Table of Critical Ratio Levels of Significance for Differences Between Groups

Appendix A

List of Sub-Tests and Their Possible Score Range

Sub-Test Number	Name of Inventory	Name of Sub-Test	Possible Range of Scores
1	S/DI-3	Exactly the Same	0-12
2		Different	0-12
3	NNI	Non-Verbal	0-20
4		Verbal	0-20
5	CNI	Non-Verbal	0-12
6		Verbal	0-12
7	ANI/PUC	Non-Verbal	0-26
8		Verbal	0-26
9	SNI	Non-Verbal	0-8
10		Verbal	0-8
11	BPNI	Non-Verbal	0-10
12		Verbal	0-10
13		Functions	0-5

Note: Except for BPNI, Non-Verbal measures refer to the total correct on both forms (e.g., if the letter "G" is correct on Form A, but not on Form B, it is scored as incorrect.) Hence the non-verbal scores reflect the total "2" scores.

APPENDIX B

FACSIMILE

ECIP INDIVIDUAL SCORING SHEET

Child's Name_____

Date of Birth_____ Sex: M F

Date of Testing_____

Ad's Initials_____

School_____ Grade: PRE-K K
1 2

Community Name_____
E-PK E-K E-1

County CHS-PK CHS-K CK-K State_____
CK-1 C1-1

Bilingual: YES NO Principal
Pre-test re-test Language_____

LEAVE GRID BLANK FOR IBM CODING

a SES	a	b	b	c	c
c MO	d	d	d	e	f
f R	g	h	i	j	

SAME DIFFERENT INVENTORY-III (SDI-III)

SAME		DIFFERENT	
1. L R	7. L R	1. L R	7. L R
2. L R	8. L R	2. L R	8. L R
3. L R	9. L R	3. L R	9. L R
4. L R	10. L R	4. L R	10. L R
5. L R	11. L R	5. L R	11. L R
6. L R	12. L R	6. L R	12. L R
TOTAL_____		TOTAL_____	

SAMPLES

i. L R iii. L R i. L R iii. L R

ii. L R iv. L R ii. L R iv. L R

COLOR NAME INVENTORY (CNI)

VERBAL (V)

1. pur___	5. gry___	9. tan___
2. blu___	6. org___	10. blk___
3. red___	7. wht___	11. yel___
4. brn___	8. grn___	12. pnk___

TOTAL_____

NUMERAL NAME INVENTORY (NNI)

NONVERBAL (NV) Set A

i. a b c d
ii. a b c d
iii. a b c d
iv. a b c d

A	0	2	14	10
B	6	18	4	16
C	19	2	12	4
D	10	3	13	5
E	4	14	6	18
F	7	15	12	5
G	13	8	16	6
H	15	17	7	9
I	18	11	0	8
J	1	17	19	9

v. a b c d
vi. a b c d

K	10	9	0	12
L	5	13	1	11
M	8	2	14	12
N	13	3	6	15
O	14	3	16	4
P	17	15	5	2
Q	1	11	3	16
R	19	0	17	7
S	8	7	18	11
T	9	19	1	10

TOTAL_____

NONVERBAL (NV) Set B

i. a b c d
ii. a b c d
iii. a b c d
iv. a b c d

A	14	10	0	2	1	2
B	4	16	6	18	1	2
C	12	4	19	2	1	2
D	13	5	10	3	1	2
E	6	18	4	14	1	2
F	12	5	7	15	1	2
G	16	6	13	8	1	2
H	7	9	15	17	1	2
I	0	8	18	11	1	2
J	19	9	1	17	1	2

v. a b c d
vi. a b c d

K	0	12	10	9	1	2
L	1	11	5	13	1	2
M	14	12	8	2	1	2
N	6	15	13	3	1	2
O	16	8	14	3	1	2
P	5	2	17	15	1	2
Q	3	16	1	11	1	2
R	17	7	19	0	1	2
S	18	11	8	7	1	2
T	1	10	9	19	1	2

TOTAL_____ — —

VERBAL (V)

A 4___	F 7___	K 15___	P 14___
B 8___	G 16___	L 17___	Q 6___
C 10___	H 11___	M 9___	R 1___
D 12___	I 0___	N 2___	S 19___
E 5___	J 3___	O 18___	T 13___

TOTAL_____

COLOR NAME INVENTORY (CNI)

NONVERBAL (NV)

Set A				Set B					
1. pur	blu	red	brn	1. brn	red	blu	pur	1	2
2. gry	org	wht	grn	2. grn	wht	org	gry	1	2
3. tan	blk	yel	pnk	3. pnk	yel	blk	tan	1	2
4. red	brn	gry	org	4. org	gry	brn	red	1	2
5. wht	grn	tan	blk	5. blk	tan	grn	wht	1	2
6. yel	pnk	pur	blu	6. blu	pur	pnk	yel	1	2
7. blu	red	brn	gry	7. gry	brn	red	blu	1	2
8. org	wht	grn	tan	8. tan	grn	wht	org	1	2
9. blk	yel	pnk	pur	9. pur	pnk	yel	blk	1	2
10. brn	gry	org	wht	10. wht	org	gry	brn	1	2
11. grn	tan	blk	yel	11. yel	blk	tan	grn	1	2
12. pnk	pur	blu	red	12. red	blu	pur	pnk	1	2

TOTAL_____ TOTAL_____ — —

ALPHABET NAME INVENTORY (ANI)
(UPPER CASE -- PRINTED)

NONVERBAL (NV)

Set A										
xi.	a	b	c	d	ii.	a	b	c	d	
iii.	a	b	c	d	iii.	a	b	c	d	
iv.	a	b	c	d	iv.	a	b	c	d	
v.	a	b	c	d	v.	a	b	c	d	
1.	K	[illegible]	O	J	1.	O	J	K	T	1 2
2.	M	Y	A	P	2.	A	P	M	Y	1 2
3.	I	W	S	M	3.	S	M	I	W	1 2
4.	V	T	G	H	4.	G	H	V	T	1 2
5.	[illegible]	G	V	O	5.	V	O	L	G	1 2
6.	Q	G	P	R	6.	P	R	Q	G	1 2
7.	J	N	C	F	7.	C	F	J	N	1 2
8.	A	P	Y	U	8.	Y	A	U	P	1 2
9.	X	N	B	O	9.	B	O	X	N	1 2
10.	R	E	K	Q	10.	K	Q	R	E	1 2
11.	X	C	N	B	11.	N	B	X	C	1 2
12.	S	U	W	I	12.	W	I	S	U	1 2
13.	D	X	I	W	13.	I	W	D	K	1 2
viii.	a	b	c	d	viii.	a	b	c	d	
ix.	a	b	c	d	ix.	a	b	c	d	
14.	Y	U	C	R	14.	C	R	Y	U	1 2
15.	Z	P	I	K	15.	I	K	Z	P	1 2
16.	D	K	W	T	16.	W	T	D	K	1 2
17.	G	A	H	X	17.	H	X	G	A	1 2
18.	Q	L	N	B	18.	N	B	Q	L	1 2
19.	F	Z	D	[illegible]	19.	D	A	F	Z	1 2
20.	T	M	O	J	20.	O	J	T	M	1 2
21.	C	R	J	B	21.	J	B	C	R	1 2
22.	N	Y	E	U	22.	E	U	N	Y	1 2
23.	G	I	H	X	23.	H	X	G	T	1 2
24.	O	L	F	Z	24.	F	Z	O	L	1 2
25.	L	O	V	M	25.	V	M	L	O	1 2
26.	Q	B	A	S	26.	A	S	Q	B	1 2
TOTAL					TOTAL					

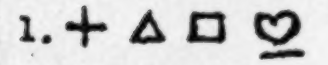
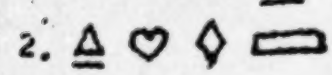
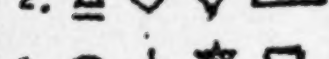
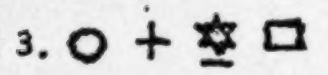
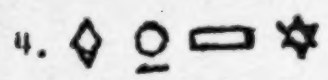
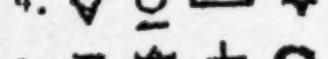
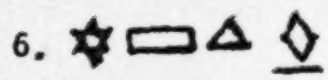
VERBAL (V)

Wheel #1			
1.	N	1.	Q
2.	O	2.	B
3.	R	3.	J
4.	T	4.	G
5.	D	5.	M
6.	I	6.	V
7.	L	7.	K
8.	H	8.	W
9.	P	9.	Y
10.	E	10.	Z
11.	C	11.	X
12.	A	12.	U
13.	S	13.	F

FOR IBM CODING

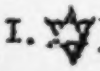
SHAPE NAME INVENTORY (SNI)

NONVERBAL

1.  1 2
2.  1 2
3.  1 2
4.  1 2
5.  1 2
6.  1 2
7. 1 2
8.  1 2

TOTAL_____ TOTAL_____ _____

VERBAL

1.  _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

TOTAL_____

BODY PARTS NAME INVENTORY (BPNI)

	NONVERBAL (NV)	VERBAL (V)
1.	Chin_____	1. Chin_____
2.	Stomach_____	2. Stomach_____
3.	Neck_____	3. Neck_____
4	Arm_____	4. Arm_____
5.	Knee_____	5. Knee_____
6.	Ankle_____	6. Ankle_____
7.	Thigh_____	7. Thigh_____
8.	Cheek_____	8. Cheek_____
9.	Wrist_____	9. Wrist_____
10.	Knuckle_____	10. Knuckle_____
	TOT._____	TOT._____

FUNCTIONS (F)

1. Shoes on _____
2. Hat on _____
3. Smell through _____
4. Gloves on _____
5. Lick with _____

TOT. _____

Appendix C

Tables of Means, Standard Deviations, and Standard Error of the Mean Squared For Each Inventory

Symbols

M	Mean
SD	Standard Deviations
S_m^2	Standard error of the Mean Squared
N	Size of Sample Per Group
E	Enrichment Groups (IDS)
CHS	HeadStart Comparison Group
CK	Comparison Group Without Pre-Kindergarten
C1	Comparison Group Without Kindergarten (some children had pre-kindergarten experience)

Group Designations

pk	Groups Starting school at Pre-kindergarten
k	Groups Starting School at Kindergarten
1	Groups Starting School at First Grade
-PK	Groups Now Enrolled in Pre-Kindergarten
-K	Groups Now Enrolled in Kindergarten
-1	Group Now Enrolled in First Grade

Table 1

SAME/DIFFERENT INVENTORY - 3 (S/DI-3)

SAME

Pre-kindergarten	Epk-PK	CHSpk-PK
M	8.38	8.33
SD	2.04	1.92
S_m^2	0.15	0.13
N	29	30

Kindergarten	Epk-K	CHSpk-K	C_k-K
M	10.03	10.70	9.22
SD	1.83	1.70	2.37
S_m^2	0.12	0.10	0.33
N	30	30	18

1st Grade	Epk-1	C_k-1	C_1-1
M	11.41	11.03	10.57
SD	0.91	1.54	1.63
S_m^2	0.03	0.08	0.13
N	32	30	21

DIFFERENT

Pre-kindergarten	Epk-PK	CHSpk-PK
M	7.03	6.83
SD	2.23	2.31
S_m^2	0.18	0.18
N	29	30

Kindergarten	Epk-K	CHSpk-K	C_k-K
M	10.10	10.40	8.00
SD	1.65	1.90	3.11
S_m^2	0.09	0.13	0.57
N	30	30	18

1st Grade	Epk-1	C_k-1	C_1-1
M	11.19	10.67	10.38
SD	1.31	1.97	1.99
S_m^2	0.06	0.13	0.20
N	32	30	21

Table 2

NUMERAL NAME INVENTORY (NNI)

Non-verbal (corrected scores)

Pre-kindergarten	Epk-PK	CHSpk-PK
M	2.38	2.80
SD	3.45	3.87
S_m^2	0.42	0.52
N	29	30

Kindergarten	Epk-K	CHSpk-K	Ck-K
M	11.43	6.80	5.83
SD	5.94	7.37	5.58
S_m^2	1.22	1.87	1.83
N	30	30	18

1st Grade	Epk-1	C_k-1	C_1-1
M	15.97	11.77	10.81
SD	5.13	6.45	6.30
S_m^2	0.85	1.44	1.98
N	32	30	21

Verbal

Pre-kindergarten	Epk-PK	CHSpk-PK
M	1.45	2.63
SD	2.52	4.17
S_m^2	0.23	0.60
N	29	30

Kindergarten	Epk-K	CHSpk-K	C_k-K
M	10.43	6.13	5.33
SD	5.42	6.80	6.40
S_m^2	1.01	1.60	2.41
N	30	30	18

1st Grade	Epk-1	C_k-1	C_1-1
M	14.88	10.67	9.90
SD	5.45	6.50	6.06
S_m^2	0.96	1.46	1.83
N	32	30	21

Table 3

COLOR NAME INVENTORY (CNI)

Non-Verbal (corrected scores)

Pre-kindergarten	Epk-PK	CHSpk-PK
M	4.90	3.93
SD	3.71	3.52
S_m^2	0.49	0.43
N	29	30

Kindergarten	Epk-K	CHSpk-K	C_k-K
M	10.37	9.67	8.89
SD	1.56	2.94	2.59
S_m^2	0.08	0.30	0.39
N	30	30	18

1st Grade	Epk-1	C_k-1	C_1-1
M	11.03	10.30	9.10
SD	1.09	1.68	2.41
S_m^2	0.04	0.10	0.29
N	32	30	21

Verbal

Pre-kindergarten	Epk-PK	CHSpk-PK
M	4.28	3.70
SD	3.34	3.74
S_m^2	0.40	0.48
N	29	30

Kindergarten	Epk-K	CHSpk-K	C_k-K
M	9.63	8.43	7.78
SD	1.83	3.11	3.17
S_m^2	0.12	0.33	0.59
N	30	30	18

1st Grade	Epk-1	C_k-1	C_1-1
M	10.06	9.57	7.14
SD	1.81	1.81	3.18
S_m^2	0.11	0.11	0.51
N	32	30	21

Table 4

ALPHABET NAME INVENTORY/
PRINTED UPPER CASE (ANI/PUC)

Non-Verbal (corrected scores)

Pre-kindergarten	Epk-PK	CHSpk-PK
M	2.83	4.33
SD	4.37	6.19
S_m^2	0.68	1.32
N	29	30

Kindergarten	Epk-K	CHSpk-K	C_k-K
M	13.70	9.73	6.61
SD	8.50	8.81	6.63
S_m^2	2.49	2.68	2.59
N	30	30	18

1st Grade	Epk-1	C_k-1	C_1-1
M	16.88	14.30	12.38
SD	8.83	7.59	8.46
S_m^2	2.52	1.99	3.58
N	32	30	21

Verbal

Pre-kindergarten	Epk-PK	CHSpk-PK
M	1.52	3.10
SD	2.52	5.87
S_m^2	0.23	1.19
N	29	30

Kindergarten	Epk-K	CHSpk-K	C_k-K
M	12.00	7.30	4.11
SD	8.59	8.18	5.83
S_m^2	2.54	2.31	5.83
N	30	30	18

1st Grade	Epk-1	C_k-1	C_1-1
M	14.41	10.80	10.19
SD	9.00	7.74	8.62
S_m^2	2.61	2.07	3.72
N	32	30	21

Table 5

SHAPE NAME INVENTORY (SNI)

Non-Verbal (corrected scores)

Pre-kindergarten	Epk-PK	CHSpk-PK
M	3.07	2.07
SD	2.14	1.78
S_m^2	0.16	0.11
N	29	30

Kindergarten	Epk-K	CHSpk-K	C_k-K
M	6.13	5.77	4.94
SD	1.83	1.68	1.80
S_m^2	0.12	0.10	0.19
N	30	30	18

1st Grade	Epk-1	C_k-1	C_1-1
M	6.97	6.67	5.00
SD	0.97	1.32	1.45
S_m^2	0.03	0.06	0.10
N	32	30	21

Verbal

Pre-kindergarten	Epk-PK	CHSpk-PK
M	2.10	1.20
SD	2.14	1.40
S_m^2	0.16	0.07
N	29	30

Kindergarten	Epk-K	CHSpk-K	C_k-K
M	5.83	4.47	4.50
SD	1.51	1.93	2.09
S_m^2	0.08	0.13	0.26
N	30	30	18

1st Grade	Epk-1	C_k-1	C_1-1
M	6.44	5.90	4.24
SD	1.44	1.40	1.81
S_m^2	0.07	0.07	0.16
N	32	30	21

Table 6

BODY PARTS NAME INVENTORY (BPNI)

Non-Verbal

Pre-kindergarten	Epk-PK	CHSpk-PK
M	5.28	4.60
SD	1.56	1.52
S_m^2	0.09	0.08
N	29	30

Kindergarten	Epk-K	CHSpk-K	C_k-K
M	6.83	6.33	5.89
SD	1.44	1.63	1.49
S_m^2	0.07	0.09	0.13
N	30	30	18

1st Grade	Epk-1	C_k-1	C_1-1
M	7.69	6.40	5.29
SD	1.45	1.45	1.52
S_m^2	0.07	0.07	0.12
N	32	30	21

Verbal

Pre-kindergarten	Epk-PK	CHSpk-PK
M	4.90	4.30
SD	1.47	1.49
S_m^2	0.08	0.08
N	29	30

Kindergarten	Epk-K	CHSpk-K	C_k-K
M	7.00	6.27	5.39
SD	1.49	1.66	1.61
S_m^2	0.08	0.09	0.15
N	30	30	18

1st Grade	Epk-1	C_k-1	C_1-1
M	7.91	6.60	5.38
SD	1.35	1.52	1.32
S_m^2	0.06	0.08	0.09
N	32	30	21

Table 6 (continued)

	Functions			
Pre-kindergarten	Epk-PK	CHSpk-PK		
M	3.24	2.50		
SD	1.60	1.43		
S_m^2	0.09	0.07		
N	29	30		
Kindergarten	Epk-K	CHSpk-K	C_k-K	
M	4.10	4.37	3.67	
SD	0.92	0.93	1.08	
S_m^2	0.03	0.03	0.07	
N	30	30	18	
1st Grade	Epk-1		C_k-1	C_1-1
M	4.78		4.37	4.24
SD	0.55		0.81	1.00
S_m^2	0.01		0.02	0.05
N	32		30	21

Appendix D

Combined Table of Means and Standard Deviations

Group	N		S/DI S 12*	S/DI D 12	NNI NV-2** 20	NNI V 20	CNI NV-2 12	CNI V 12	ANI/PUC NV-2 26	ANI/PUC V 26	SNI NV-2 8	SNI V 8	BPNI NV 10	BPNI V 10	BPNI F 5
Epk-PK	29	$\bar{X}$	8.38	7.03	2.38	1.45	4.90	4.28	2.83	1.52	3.07	2.10	5.28	4.90	3.24
		SD	2.04	2.23	3.45	2.52	3.71	3.34	4.37	2.52	2.14	2.14	1.56	1.47	1.60
Epk-K	30	$\bar{X}$	10.03	10.10	11.43	10.43	10.37	9.63	13.70	12.00	6.13	5.83	6.83	7.00	4.10
		SD	1.83	1.65	5.94	5.42	1.56	1.83	8.50	8.59	1.83	1.51	1.44	1.49	0.92
Epk-1	32	$\bar{X}$	11.41	11.19	15.97	14.88	11.03	10.06	16.88	14.41	6.97	6.44	7.69	7.91	4.78
		SD	0.91	1.31	5.13	5.45	1.09	1.81	8.83	9.00	0.97	1.44	1.45	1.35	0.55
CHSpk-PK	30	$\bar{X}$	8.33	6.83	2.80	2.63	3.93	3.70	4.33	3.10	2.07	1.20	4.60	4.30	2.50
		SD	1.92	2.31	3.87	4.17	3.52	3.74	6.19	5.87	1.78	1.40	1.52	1.49	1.43
CHSpk-K	30	$\bar{X}$	10.70	10.40	6.80	6.13	9.67	8.43	9.73	7.30	5.77	4.47	6.33	6.27	4.37
		SD	1.70	1.90	7.37	6.80	2.94	3.11	8.81	8.18	1.68	1.93	1.63	1.66	0.93
Ck-K	18	$\bar{X}$	9.22	8.00	5.83	5.33	8.89	7.78	6.61	4.11	4.94	4.50	5.89	5.39	3.67
		SD	2.37	3.11	5.58	6.40	2.59	3.17	6.63	5.83	1.80	2.09	1.49	1.61	1.08
Ck-1	30	$\bar{X}$	11.03	10.67	11.77	10.67	10.30	9.57	14.30	10.80	6.67	5.90	6.40	6.60	1.37
		SD	1.54	1.97	6.45	6.50	1.68	1.81	7.59	7.74	1.32	1.40	1.45	1.52	0.81
C1-1	21	$\bar{X}$	10.57	10.38	10.81	9.90	9.10	7.14	12.38	10.19	5.00	4.24	5.29	5.38	4.24
		SD	1.63	1.99	6.30	6.06	2.41	3.18	8.46	8.62	1.45	1.81	1.52	1.32	1.00

*These numbers in this row represent maximum score for each sub-test.

**NV-2 = non-verbal "2" scores (or corrected scores) - see analyses of data section in body of report for fuller description of this score.

Appendix E

Summary Table of Critical Ratio
Levels of Significance for
Differences Between Groups

Comparisons

Group I	Group II	S/DI S	S/DI D	NNI NV-2	NNI V	CNI NV-2	CNI V	ANI NV-2	ANI V	SNI NV-2	SNI V	BPNI NV	BPNI V	BPNI F
A. Within Grade														
++Epk-PK	CHSpk-PK	--	--	--	--	--	--	--	--	--	--	--	--	--
+Epk-K	CHSpk-K	--	--	.005	.005	--	.05	.05	.025	--	.005	--	.05	--
+Epk-K	Ck-K	--	.005	.005	.005	.025	.025	.005	.0005	.025	.025	.025	.0005	--
+CHSpk-K	Ck-K	.025	.005	--	--	--	--	--	--	--	--	--	.05	.025
+Epk-1	Ck-1	--	--	.005	.005	.025	--	--	.05	--	--	.0005	.0005	.01
+Epk-1	Cl-1	.025	--	.005	.005	.0005	.0005	.05	.05	.0005	.0005	.0005	.0005	.025
+Ck-1	Cl-1	--	--	--	--	.05	.005	--	--	.0005	.0005	.01	.005	--
B. Cross Sectional Within Groups														
+Epk-K	Epk-PK	.005	.0005	.0005	.0005	.0005	.0005	.0005	.0005	.0005	.0005	.0005	.0005	.01
+Epk-1	Epk-K	.0005	.005	.005	.005	.05	--	--	--	.025	--	.025	.01	.0005
+CHSpk-K	CHSpk-PK	.0005	.0005	.005	.01	.0005	.0005	.005	.025	.0005	.0005	.0005	.0005	.0005
+Ck-1	Ck-K	.005	.005	.005	.005	.025	.025	.0005	.0005	.0005	.01	--	.01	.01
C. Cross Sectional Across Groups														
++Ck-1	Epk-K	.05	--	--	--	--	--	--	--	--	--	--	--	--
++Ck-1	CHSpk-K	--	--	.01	.01	--	--	.05	.01	.05	--	--	--	--
++Cl-1	Epk-K	--	--	--	--	*.05	*.01	--	--	*.02	*.01	*.005	*.005	--
++Cl-1	CHSpk-K	--	--	.05	.05	--	--	--	--	--	--	*.05	*.05	--
++Cl-1	Ck-K	.05	.01	.02	.05	--	--	.02	.02	--	--	--	--	--

++ two-tailed test
+ one-tailed test
* difference in favor of Group II

Note: Numbers represent level of significance reached.
Actual CR's will be presented in subsequent reports.